

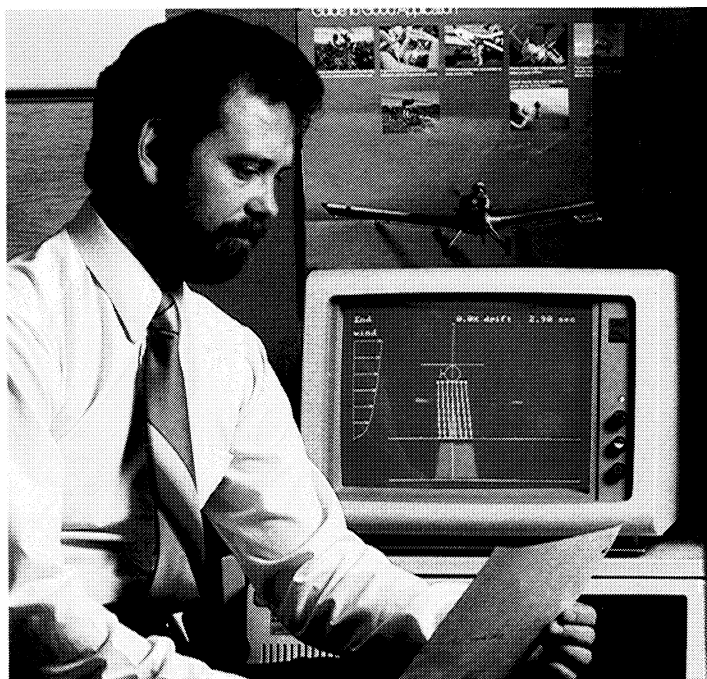
A decade-long program of research on agricultural aviation, conducted by Langley Research Center, focused on investigations designed to help the aerial crop dusting and spraying industry solve a major problem: wasteful drift of chemical beyond target areas, a matter that was heightening environmental concerns and was becoming ever more expensive as chemical costs increased.

Langley's investigations involved studies of aircraft wake and how the wake affects chemical dispersal patterns; the aim was to identify modifications to airplanes or to dispersal equipment to allow more accurate, more uniform spray patterns. From this research came an important aid to aerial applicators and equipment designers, a computer code called AGDISP (for Agricultural Dispersal) that allows accurate spray and drift predictions. Jointly funded by NASA and the Forest Service of the Department of Agriculture, AGDISP was written for Langley by Continuum Dynamics, Inc., Princeton, New Jersey.

Continuum Dynamics has since advanced the technology another step by developing, with company funds, a commercially available

version of the code for use on a personal computer by an operator who need not have any prior computer experience. Called SWA+H (Spray Width for Airplanes Plus Helicopters), the software models the turbulent flow behind an agricultural aircraft and predicts the motion of materials released from spray nozzles, taking into consideration airplane, atmospheric, material and nozzle characteristics. The printer output (right) provides detailed information on the concentrations and motions of the spray cloud, including an estimate of drift. The user may then change certain factors—such as spray height or nozzle position—to achieve the desired swath width and application concentration while minimizing drift.

SWA+H users include the Forest Service, the Federal Aviation Administration and a number of agricultural chemical manufacturers, one of which is The DuPont Company's Agricultural Products Division, Wilmington, Delaware. It is difficult and expensive to field test different equipment and chemicals in actual flight, because the environment is so variable, so DuPont uses



SWA+H to save time and money by narrowing the parameters; computer data is then checked out by "field testing for truth." Essential input to the computer code is data on the characteristics of the chemicals and dispersion systems. One of the ways DuPont accomplishes this is by using the laser system at right to measure the particle characteristics of various spray compounds. Particles released from a dispersal system (top of photo) are measured by the laser unit (gold); then the laser beam is moved from side to side (red) and the particles are measured along the radius of their trajectory. ▲

